Magnification and Illumination in Endodontics

CPT Jim Corcoran
Endodontic Resident FT Bragg, NC

OUTLINE

Introduction

- Why use magnification/ illumination- we work in small, dark spaces
- Magnification and illumination come as a pair; you need both in order to maximize the effectiveness of each.
- This lecture will concentrate on the combination of operating microscopes and supplemental light sources.

Magnification

Visual Enhancers

- Headband Magnifier
- Loupes
- Endoscope
- Microscope

Advantages/ disadvantages

- Headband Magnifier- typically lower magnification, good for prosthodontics, lab work. Provides wide field of view. Not well suited for endodontics.

- Loupes- cheaper, not as powerful, magnification is set, not adjustable, higher power and prescription loupes are heavy, need external light source, easier to introduce poor ergonomics; through-the lens types are not adjustable.

- Endoscope- Easy to use, can see down into canals, sub-gingival, distal of teeth. Unit is handheld, difficult to use endoscope and other instruments simultaneously. Not as common as operating microscope.

- Microscope- expensive, not easily moved, improves ergonomics and eyestrain, fully adjustable; mechanics, magnification, working length. Can document through microscope with video and photographs.

Background of the operating microscope (OM)

Operating microscopes were originally used in medicine and were converted to use in dentistry.

- Fertility/sterility
- Microvascular Surgery
- Neurosurgery
- Opthalmology
- Otolaryngology
- Reconstructive Surgery

Requirements for the OM

- Expandable
- Focal length
- Light
- Magnification range
- Mounting
- Ability to disinfect

Manufacturers

- Global
- Jedmed
- Lecia
- Seiler
- Zeiss

Nonsurgical uses

- Access preparation
- Locating calcified canals, MB2
- Removing separated instruments
- Removing posts with ultrasonic
- Internal perforation repairs
- Evaluation of crown/root fractures
- Internal inspection prior to obturation

Surgical Use

Greater magnification allows the use of smaller access preparations, facilitating the use of smaller operating equipment, giving more predictable results and decreased healing time.

- Light and visibility- Line of sight
- Smaller osteotomies
- Decreased bevel angle
- Treatment of isthmus
- Root end resection
- Root end inspection
- Root end preparation
- Root-end fill

Illumination

Requirements

- Power source
- Stabilization over long periods of time/ yet easily movable
- Cooling fan
- Bulb life/ cost of bulb
- Ability to disinfect

Manufacturers

Dental

- ADEC
- Midwest
- Pelton

Non-Dental

- Nite-ize
- Mag-light
- Remington

Dental Uses of Illumination

- Illumination is one of the vital parts of dentistry
- Illuminate dental operating field in all areas of dentistry
- Diagnosis
  - Trans-illumination- detection of tooth fracture
- Treatment
  - Access
  - Location of canals

Combination of Magnification and Illumination

- Magnification and illumination come as a pair; you need both in order to maximize the effectiveness of each.
- Magnifying the size of an object spreads the same number of light waves over a greater area, thereby decreasing amount of illumination.
- Greatly increase the visibility of the object, making treatment easier, faster, better.

Advantages

- Line of sight
- Ability to more easily visualize, therefore diagnose and better treat problem
- Better prognosis

Disadvantages

- Cost
- Decreased field of view
- Decreasing illumination with increasing magnification
- Difficult/ Unable to move between patients
- May be difficult to use between doctors
- Line of sight

Conclusion

- Magnification/ illumination is necessary in dentistry because we work in small, dark spaces
- Magnification and illumination come as a pair; you need both in order to maximize the effectiveness of each.
- This lecture concentrated on the combination of operating microscopes and supplemental light sources; there are other sources of both magnification and illumination available.
- You can't treat what you can't see.